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NOTE

Polistes goeldii (Hymenoptera: Vespidae) is a Widespread but Rare Social Wasp

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Polistes goeldii Ducke was described from the Amazon region of Brazil. It is a large, robust social wasp, metallic blue-black except for the mandibles and lower part of the clypeus, which are reddish. Given its size and color pattern, it bears a striking resemblance to some members of the genus *Synoeca*, especially the widespread *S. septentrionalis* Richards and *S. surinama* (L.). Although *P. goeldii* can presumably deliver a powerful sting, it has very small colonies in comparison with the fearsome *Synoeca* spp., so that the resemblance between the two is almost certainly batesian mimicry. That is, it seems out of the question that *Synoeca* gains any defensive advantage from potential predators' experience with *P. goeldii*.

Polistes goeldii is a distinctive wasp with an even more distinctive nest. In September 2004 we found an active colony of this species at Caura Village, Trinidad, West Indies with a nest matching in its overall form all others that we have seen and that have been described to us, as well as a description by Richards (1978:522). It was a single comb hanging from a highly excentric petiole, attached to a fence wire a little over one meter from the ground. The petiole was relatively stout, about 3 mm long. The comb consisted of 22 cells in just two rows, each cell attached some distance below the base of its predecessor, so that the comb descended sharply from the petiole (Figs. 1–2). The largest nest of this species of which we are aware had just 52 cells (Richards 1978:522).

The cell material was medium-gray carton. The petiole and the comb top around it were covered in shiny black varnish, which was also applied in spots elsewhere on the comb. Newer cells showed less varnish than older ones, consistent with the wasps periodically applying it over the entire comb. The pupal caps bulged moderately below the cell mouths. They had only slight daubs of pulp applied to them but were abundantly spotted with dark varnish.

Over the course of three days we never saw more than two adult females on the nest, presumably the full number at that stage. Three cells had fecal pellets in their bases (Fig. 2), indicating that each had produced an adult and now contained a second brood individual. The walls of these cells were cut back to make them much shorter (Fig. 1).

Richards (1978) recorded *P. goeldii* from a few localities in Brazil, Colombia, Ecua-

Fig. 1. *Polistes goeldii* colony in place at Caura Village, Trinidad, West Indies. The length of the comb is 128 mm. The upper wasp's mid- and hind-legs straddle cells that have been cut back.

dor and Peru, as well as from "Salvador". The identity of this latter is uncertain, but it may refer to the city of that name in Bahia state, Brazil. The published range of *P. goeldii*, therefore, comprises an equatorial belt over about 13 degrees of latitude on both sides of the Andes.

In fact, the species is much more widespread. Fig. 3 shows the presently known localities of *P. goeldii*. These are based on specimens that we have examined in the National Institute for Biodiversity (INBio) in Costa Rica, Museum of the Institute Agricultural Zoology (MIZA) of the Central University of Venezuela, and Land Arthropod Collection of the University of the West Indies (UWI) in Trinidad & Tobago, and personal communications from J.M. Carpenter, J.H. Hunt, R.L. Jeanne and W.L. Overal, as well as Richards'

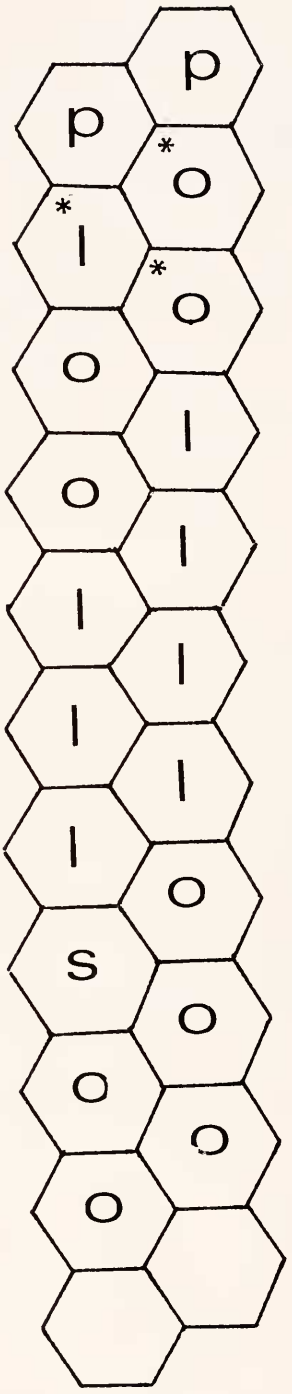

Fig. 2. Cell map of the nest shown in Fig. 1. Cell contents: l large larva (probably instar 4–5), o egg or instar-1 larva, p with pupal cap, s small larva (probably instar 2–3). The two lowest cells were empty. Asterisked cells have a fecal pellet. The petiole was attached to the top-most cell.

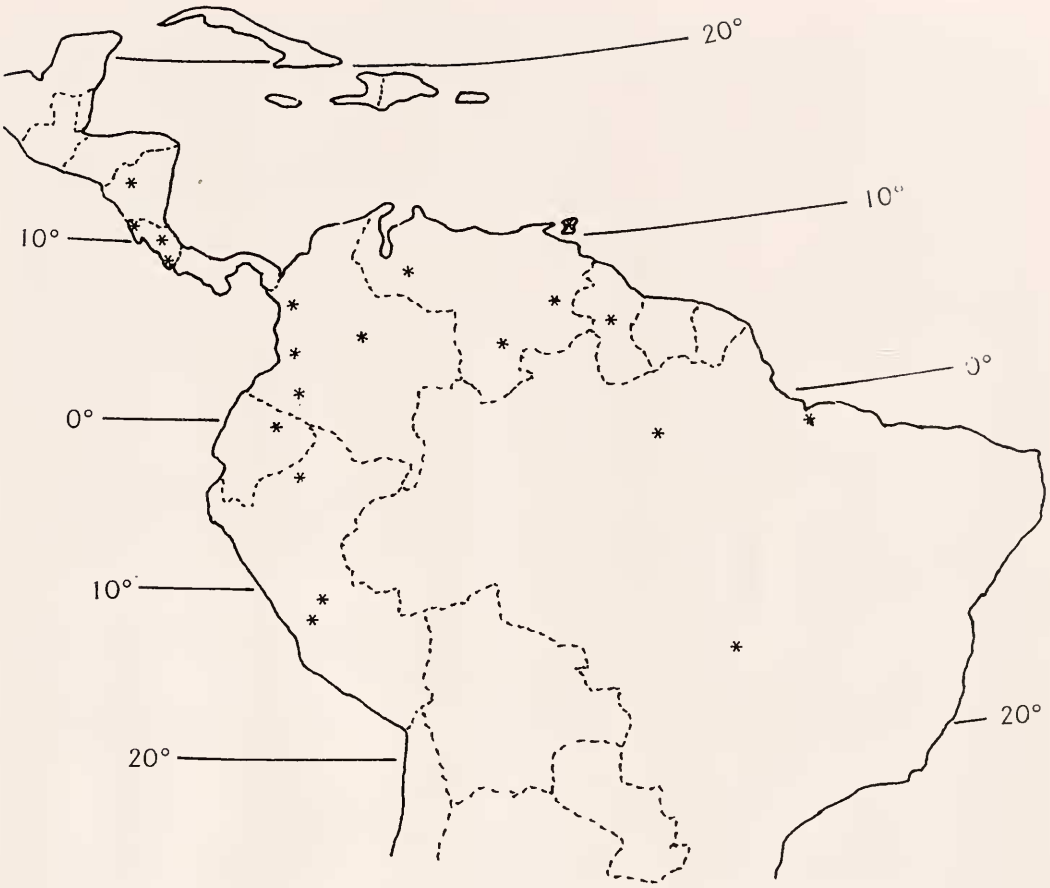

Fig. 3. Central America and northern South America, to show known localities of *Polistes goeldii*.

(1978) records with the exception of "Salvador".

It is remarkable that the broad range of such a distinctive wasp should have gone unrecognized until now. The most likely explanation is that *P. goeldii* is rare wherever it occurs. As an example, at the time we encountered the colony shown in Fig. 1 the authors had a combined residence of about 16 years in Trinidad and had long since come to suppose that we had recorded all social wasp species existing in the island. Yet this colony was nesting just a few hundred meters from our residence.

P. goeldii bears a strong overall resemblance to *P. aterrimus* Saussure, presumably also a batesian mimic of *Synoeca* spp. The two are most readily distinguished by the pronotal keel (sharp and extensive in each, but smoothly curving in *P. goeldii*, versus with distinct humeral "shoulders" in *P. aterrimus*) and the propodeal striae (confined to the median furrow in *P. goeldii*, versus extending strong onto the sides in *P. aterrimus*), as well as by their nests (*P. aterrimus* with a broad comb from an excentric petiole, as in many other neotropical species). The two species overlap very broadly in their ranges, although there is a more or less distinct altitudinal separation, *P. aterrimus* being found at higher elevations.

Based on museum specimens, *P. aterrimus* appears to be much more common than *P. goeldii*. In the INBio collection we

found just six specimens of *P. goeldii*, versus 59 of *P. aterrimus*. The corresponding figures for the MIZA collection are five and 41. Similarly, the combined insect museums of Colombia have four specimens of *P. goeldii* and 32 of *P. aterrimus* (C.E. Sarmiento, pers. comm.). In no case is the preponderance of *P. aterrimus* specimens due to a large nest series, so that the comparison appears to be fair.

We have seen *P. goeldii* at Belém, Pará, Brazil, one of the type localities, and R.L. Jeanne and W.L. Overal (pers. comms.) report seeing it there as well. Even at Belém, however, it appears to be uncommon.

Across a broad range of plants and animals, there is a clear positive correlation between geographic range size and local abundance (Gaston 2003:115–16). We are not aware that this rule has been examined with respect to any group of social insects, but it is our definite impression that it applies well to neotropical social wasps. Such very widespread species as *Polistes versicolor* (Olivier) and *Polybia rejecta* (F.), for example, seem to be abundant almost everywhere that they are found, while we know of no very restricted species – with the exception of some endemic to the oceanic islands of the Antilles – that one would characterize as common.

P. goeldii, then, appears to present a striking exception to this rule. This suggests that its niche is somehow unusually narrow for its genus. A good place to look would be in its feeding habits.

The scant evidence available suggests that colonies are characteristically small and that nests never become large. It is noteworthy that the Trinidad nest, comprising just 22 cells, had already produced three adults and two pupae. A small colony and nest proffer the possibility of cryptic escape from predators, and several features of the nest are consistent with such an approach. The narrowness of the steeply-hanging comb allows it to resemble a short vine, something quite outside of a predator's search image derived from common species. This resemblance is enhanced by the application of dark varnish on much of the comb. The removal of carton from cells from which adults had emerged may be an economy measure to conserve material, or it may be a way of diminishing the profile of the comb for a time.

If predators and entomologists find *P. goeldi* hard to locate, it is possible the wasps themselves have difficulty finding mates. It would be interesting to know if this species has special adaptations in this respect.

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